pattern of venous reflux on duplex ultrasound imaging in patients with primary CVD.

Methods: A retrospective analysis was performed of duplex ultrasound reports of patients with CVD in one institution between January 1, 2000, and August 31, 2009. Excluded were patients with secondary CVD and limbs previously treated with open surgery, endovenous ablation, and injection sclerotherapy, as were patients whose scan reports contained inadequate information. Subgroup analysis was performed to compare the pattern of venous reflux in men and women, and three age groups (<30, 30-60, >60 years). The χ^2 test was used. $P < .05$ was considered significant.

Results: The Fig summarizes the limbs that were included and excluded. After exclusion, 2888 patients (1084 men and 1804 women; mean age, 53.8 years; range, 11.9-101.2 years) were included for analysis. Saphenofemoral junction (SFJ) reflux was demonstrated in 53% of limbs (2137 of 4020; men, 58%; women, 50%; $P < .0001$). No significant difference was noticed in the proportion of SFJ incompetence between age groups ($P = .9866$). Great saphenous vein (GSV) reflux was found in 82% of limbs (3303 of 4020; men, 84%; women, 81%; $P = .0044$). No significant difference was observed in the proportion of GSV incompetence between age groups ($P = .2035$). Saphenous-popliteal junction (SPJ) reflux was found in 22% of limbs (871 of 4020; men, 21%; women, 22%; $P = .2829$). The percentage of SPJ incompetence was not significantly different between age groups ($P = .0687$). Small saphenous vein (SSV) incompetence was shown in 30% of limbs (1224 of 4020; men, 33%; women, 29%; $P = .0117$). A significant difference was also noted in the proportion of SSV reflux in between age groups ($P = .0167$). Of 1883 limbs with a competent SFJ, 1280 (68%) had refluxing GSV, and 51% of limbs (762 of 1479) with competent GSV above the knee showed GSV reflux below the knee. Five percent of limbs with an incompetent SFJ and distal GSV had a competent proximal GSV (81 of 1621). Furthermore, 20% of limbs (630 of 3149) with competent SPJ demonstrated refluxing SSV.

Conclusions: Reflux does not invariably originate at junctions of patients with primary CVD. There appears to be multifocal initiation of disease rather than following the ascending or descending theory. Some variations were observed between men and women and in different age groups. This pattern of venous reflux is likely to be due to primary venous wall changes rather than primary valvular dysfunction.

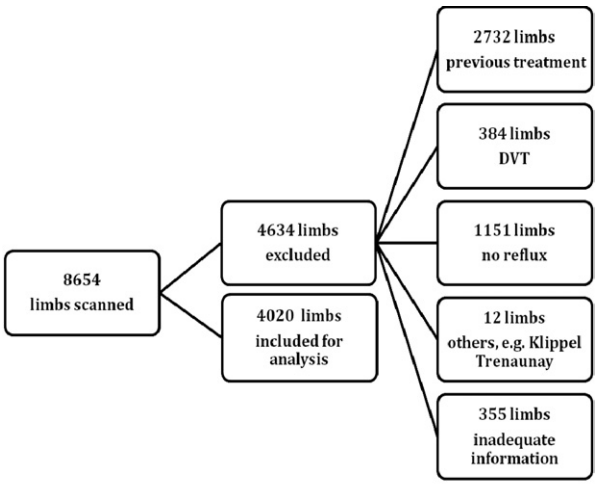

Figure 1: Inclusion and Exclusion of Limbs for Analysis

Fig. Flow chart shows inclusion and exclusion of limbs for analysis. *DVT,* Deep vein thrombosis.

Endovenous Radiofrequency Treatment for Patients with Chronic Venous Insufficiency and Venous Ulcerations

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Background: Venous ulcerations are frequently slow to heal and recurrent, causing major disability in afflicted persons. This retrospective study examined outcomes of aggressive endovenous therapy in promoting ulcer healing or preventing ulcer recurrence, or both.

Methods: In 2007 and 2008, 340 patients with venous insufficiency were treated in an academic health science center vein clinic. Reviewed were the medical records of 68 patients (18.8%) with severe chronic venous disease: 43 (73%) at C_5, and 25 (37) at C_6. Data analysis included body mass index (BMI), history of deep vein thrombosis (DVT), or prior vein surgery, and type of procedure , including radiofrequency ablation of great saphenous vein (GSV) alone or GSV and perforator ablation (GSVP). Complications, ulcer healing rates, and recurrent ulcerations were examined. Descriptive statistics are reported and contingency tables are used when appropriate.

Results: The patients (24 men, 44 women) were aged 63 ± 16 years, with a BMI of 32.4 kg/m^2 (range, 20.8-53.4 kg/m^2). Duplex scanning showed that all patients had GSV insufficiency, and 30 (44%) had deep vein incompetence. Only 19 (28%) had a history of a DVT, and 13 (19%) had prior vein procedures. Before undergoing ablation, 25 patients with C_6 disease were conservatively treated with compression for an average of 5.4 months (range, 1-13 months). Ablation alone of the GSV was performed in 49 patients (72%) and perforator ablation of the GSV was conducted in 19 (28%). Only two patients (2.9%) experienced complications. One patient had excessive hemosiderin staining; another patient had paresthesias. Of the C_5 patients treated, recurrent ulcerations developed in two (4.7%). An appreciably greater percentage of C_6 patients, 20% (n = 5), did not heal completely or developed a recurrent ulcer. The Table shows the comparison of C_5 and C_6 patients treated with and without the addition of perforator interruption. Prior treatment with compression, a history of DVT, and/or prior venous procedures did not affect patient outcomes.

Conclusions: Chronic venous insufficiency with active or healed ulceration is commonly seen in our academic health science center vein clinic. In this series, endovenous ablation allowed for excellent healing rates and acceptable recurrent ulcer rates. It is unclear from this small cohort whether the addition of perforator ablation was of benefit in improving venous hemodynamics.

Table. Comparison of C_5 and C_6 patients

Variable	C_5	C_6	*P*
Patients, No.	43	25	
Age, y	61.8	66.5	NS
Body mass index, kg/m^2	34.1	30.6	NS
Gender (male/female)	11/32	13/12	.028
Deep vein insufficiency	18	13	NS
GSV/GSVP	31/12	16/9	NS
Recurrent or nonhealing ulcer	2	5	.049

GSV, Great saphenous vein; *GSVP,* GSV perforator ablation; *NS,* not significant.

Validation of Venous Clinical Severity Score (VCSS) with Other Venous Severity Assessment Tools: Analysis from the National Venous Screening Program

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Background: With the expansion of the American Venous Forum (AVF), National Venous Screening Program (NVSP) in 2007, several standard venous assessment tools were incorporated into the screening process as independent determinants of venous disease severity, but correlation between these instruments has not been tested. The scope of this study was to assess the validity of the Venous Clinical Severity Score (VCSS) and its integration with other venous assessment tools as a global venous screening instrument.

Methods: NVSP data registry for the past 2 years was queried for participants with complete data sets including CEAP clinical staging, VCSS, modified Chronic Venous Insufficiency Quality of Life Questionnaire (CIVIQ) quality of life (QOL) assessment, and venous ultrasound results. Statistical correlation trends were analyzed using Spearman rank coefficient as related to VCSS.

Results: A total of 5814 limbs in 2907 participants were screened and included CEAP clinical stage C_0, 26%; C_1, 33%; C_2, 24%; C_3, 9%; C_4, 7%; C_5, 0.5%; and C_6, 0.2% (mean, 1.41 ±1.22). Mean VCSS mean distribution (range, 0-3) for the entire cohort included pain, 1.01 ± 0.80; varicose veins, 0.61 ± 0.84; edema, 0.61 ± 0.81; pigmentation, 0.15 ± 0.47; inflammation, 0.07 ± 0.33; induration, 0.04 ± 0.27; ulcer number, 0.004 ± 0.081; ulcer size, 0.007 ± 0.112; ulcer duration, 0.007 ± 0.134; and compression,

0.30 ± 0.81. Overall correlation between CEAP and VCSS was moderately strong (r_s = 0.49; $P < .0001$), with the highest correlation for attributes-reflecting more advanced disease, including varicose vein (r_s= 0.51; $P < .0001$), pigmentation (r_s= 0.39; $P < .0001$), inflammation (r_s= 0.28; $P < .0001$), induration (r_s = 0.22; $P < .0001$), and edema (r_s= 0.21; $P < .0001$). Based on the modified CIVIQ assessment, overall mean scores for each general category were QOL-Pain, 6.04 ± 3.12 (range, 3-15), QOL-Functional, 9.90 ± 5.32 (range, 5-25), and QOL-Social, 5.41 ± 3.09 (range, 3-15). The overall correlation between CIVIQ and VCSS was moderately strong (r_s= 0.43; $P < .0001$), with the highest correlation noted for pain (r_s= 0.55; $P < .0001$) and edema (r_s = 0.30; $P < .0001$). Screening venous ultrasound results showed reflux in 38% of limbs and 2% obstruction in the femoral, saphenous, or popliteal vein segments. Correlation between overall venous ultrasound findings (reflux + obstruction) and VCSS was slightly positive (r_s= 0.23; $P < .0001$) but was highest for varicose vein (r_s= 0.32; $P < .0001$) and showed no correlation to swelling (r_s= 0.06; $P < .0001$) and pain (r_s= 0.003; $P < .0001$).

Conclusions: Although there is correlation between VCSS, CEAP, modified CIVIQ, and venous ultrasound findings, subgroup analysis indicates that this correlation is driven by different components of VCSS compared with the other venous assessment tools. This observation may reflect that VCSS has more global application in determining overall severity of venous disease, while at the same time highlighting the strengths of the other venous assessment tools. With update of VCSS planned in the near future, validation of any revised VCSS should factor in the correlation of VCSS with other venous assessment tools.

American Venous Forum membership: Who are We and Where are We Going?

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Background: The American Venous Forum (AVF) membership was surveyed regarding their current certification and professional activities.

Methods: The certification survey was forwarded to all of the members of the AVF with a 28% response rate.

Results: Of the respondents, currently one-third have a practice limited to venous disease and two-thirds have a mixed practice. Ninety-one percent have hospital privileges that are active, and 9% do not have hospital privileges. Fifty-two percent of respondents have active privileges in an outpatient surgery center, and 48% do not participate in an outpatient surgery center. Twenty percent have a practice limited to office procedures, and 80% have a mixed practice. Sixty-five percent of the membership is board certified in vascular surgery. Several other boards are represented amongst the membership, for example: general surgery, cardiothoracic, and family practice. Respondents identified issues with hospital emergency department call coverage, endovascular privileges, or described their practice as established before vascular board certification. Emergency department call requirements appear to have regional variations with a variety of requirements for hospital privileges. Several respondents plan to limit their scope of practice to venous disease only. Many respondents identified the circular logic of the need for hospital privileges to maintain certification. Many respondents also identified the requirement for a minimum number of procedures to maintain hospital privileges while their scope of practice is still limited. This was especially problematic for arterial procedures in a practice limited to venous disease. As venous stenting, mechanical thrombectomy and thrombolytic therapies evolve, the scope of venous practice will become more diversified. The need for hospital privileges is a current requirement of the Board of Surgery for maintenance of certification.

Conclusions: Many members of the AFV have identified these issues as an impediment to board certification. Several respondents, however, identified vascular certification as a bad idea. Modular maintenance of certification was also thought to be a poor solution by some of the membership. Several members suggested a separate standard be applied to those specializing solely in venous disease. The American Board of Surgery will need to address the current requirements as maintenance of certification moves forward. The results of this survey have been shared with the American Board of Surgery.

Penetrating Inferior Vena Cava Injuries are Associated with Thromboembolic Complications: A Review of the National Trauma Data Bank

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Background: Prior studies suggest that inferior vena cava (IVC) injuries have high lethality and may increase the rate of thromboembolic complications in survivors. We sought to define the effect of penetrating IVC injury on thromboembolism risk in a large, comprehensive, nationwide registry of trauma patients.

Methods: We conducted a case-control study derived from prospectively collected data from the National Trauma Data Bank (NTDB). Cases, identified by *International Classification of Diseases, Ninth Revision* codes, were patients aged 18 to 65 years who had penetrating abdominal trauma and IVC injury. Controls were patients with penetrating abdominal injury and no IVC injury. We excluded patients with previously diagnosed deep venous thrombosis (DVT), concomitant lower extremity vascular or skeletal injury, pelvic fracture, head trauma, or spinal cord injuries. Comparative analyses of demographics, injury severity scores, type of penetrating injury, complications, and outcomes were performed.

Results: We identified 590 patients with penetrating IVC injuries and 13,061 controls with penetrating abdominal injuries without IVC injury among 1,309,311 patients in the data set. Of patients with IVC injury, 256 (43.4%) underwent some form of open repair or ligation. No endovascular repairs were reported. Demographic and outcome data are reported in the Table. Patients with IVC injury were more commonly African American and more likely to be treated at a university hospital. IVC injury was associated more frequently with gunshot wounds. Patients with IVC injury had evidence of greater injury severity, with lower presenting systolic blood pressure, higher injury severity scores, and longer intensive care unit and overall length of stay. In patients with IVC injury, the incidence of DVT was 2.88%. There was no difference in IVC filter use. Compared with control patients, patients with IVC injury had a higher risk of DVT (odds ratio, 2.4; 95% confidence interval, 1.4-3.9; P = .001). There were no differences in limb complications, including compartment syndrome, fasciotomy, or amputation, but we did confirm higher mortality in patients with IVC injury.

Table. Demographic and outcome data

Variable	*IVC injury*	*No IVC injury*	*P*
Patients, No.	590	13,061	
Age, mean ± SD, y	29.8 ± 10.2	30.9 ± 10.7	.018
Male, No. (%)	538 (91.2)	11,813 (90.4)	.566
Race, No. (%)			
African American	287 (48.6)	5,097 (39.0)	<.001
Hispanic	117(19.8)	3,090 (23.7)	
Caucasian	105(17.8)	3,248(24.9)	
Other	40 (6.78)	865 (6.62)	
Hospital type, No. (%)			
University	396 (67.1)	8,117 (62.1)	.013
Community	156 (26.4)	3,751 (28.7)	
Nonteaching	21 (3.56)	777 (5.95)	
Mechanism, No. (%)			
Firearm	487 (82.5)	7,688 (58.9)	<.001
Stab injury	98 (16.6)	5,141 (39.4)	
ED SBP, mean ± SD	93.4 ± 52.2	120.6 ± 39.7	<.001
ISS, mean ± SD	25.7 ± 14.9	15.2 ± 12.0	<.001
LOS, mean ± SD			
ICU	6.06 ± 10.9	3.78 ± 9.39	<.001
Overall	12.0 ± 19.9	9.83 ± 14.2	<.001
DVT, No. (%)	17 (2.88)	162 (1.24)	<.001
Pulmonary embolism, No. (%)	5 (0.85)	60 (0.46)	.18
IVC filter (%)	4 (0.68)	66 (0.51)	.565
Compartment syndrome, No. (%)	5 (0.85)	80 (0.61)	.478
Fasciotomy, No. (%)	7 (1.19)	134 (1.03)	.706
Amputation, No. (%)	2 (0.34)	19 (0.15)	.241
Pneumonia, No. (%)	32 (5.42)	463 (3.54)	.017
Mortality, No. (%)	306 (51.9)	1413 (10.8)	<.001

DVT, Deep venous thrombosis; *ED,* emergency department; *ICU,* intensive care unit; *ISS,* injury severity score; *IVC,* inferior vena cava; *LOS,* length of stay; *SBP,* systolic blood pressure; *SD,* standard deviation.

Conclusions: Patients with IVC injury have a higher risk of DVT than those with penetrating intra-abdominal injury alone. Penetrating IVC injury is associated with increased injury severity and mortality. Our findings emphasize the importance of developing appropriate surveillance and prevention strategies to reduce the rate of venous thromboembolism in patients with IVC injury.